STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD

In the Matter of the Application of Chanarambie Power Partners, LLC for a Site Permit for a 79.5-Megawatt Large Wind Energy Conversion System in Murray County, Minnesota	**FINDINGS OF FACT, CONCLUSIONS AND ORDER ISSUING A SITE PERMIT TO CHANARAMBIE POWER PARTNERS, LLC**
	EQB DOCKET NO. 01-19-LWECS-ENXCO

The above-entitled matter came before the Minnesota Environmental Quality Board (MEQB), pursuant to an application by enXco, Inc., for a site permit to construct, operate, maintain and manage a 79.5-Megawatt (MW) nameplate capacity Large Wind Energy Conversion System (LWECS) and associated facilities on Buffalo Ridge in Murray County, Minnesota. EnXco applied for the permit on behalf of Chanarambie Power Partners, LLC, a limited liability corporation. The permit is to be issued in the name of Chanarambie Power Partners, LLC.

Chanarambie Power Partners, LLC. was awarded a 79.5-Megawatt project by Xcel Energy, Inc. (formerly Northern States Power Company) as part of Xcel's requirement to provide 425 megawatts of wind-generated electricity. All of the proposed wind turbines, foundations, transformers, underground feeder lines and collection lines will be located in Murray County. The energy from the proposed 79.5 MW project will be delivered to Xcel's Chanarambie substation located in section 6 of Chanarambie Township in Murray County, Minnesota.

STATEMENT OF ISSUE

Should Chanarambie Power Partners, LLC, be granted a site permit under Minnesota Statutes section 116C.694 to construct a 79.5-megawatt Large Wind Energy Conversion System in the northwestern portion of Murray County, Minnesota?

Based upon the record and proceedings created in this proceeding, and the corresponding record in the Navitas Energy, LLC, permit proceeding, the Environmental Quality Board makes the following:

FINDINGS OF FACT

Background and Procedure

1. On March 16, 2001, enXco, Inc., submitted an application on behalf of Chanarambie Power Partners, LLC, to the EQB for a site permit for a 79.5-megawatt (MW) Large Wind Energy Conversion System (LWECS) to be located in Murray County, Minnesota. (Exhibit 1).

2. MEQB staff reviewed several drafts of the application prior to the submittal on March 16, 2001. EQB staff determined that the March 16, 2001, submittal complied with the application requirements, except for a power purchase agreement, and the staff noted that the MEQB would have to address this issue later. In a memorandum to the MEQB chair, dated March 16, 2001, EQB staff recommended that the MEQB chair accept the application. (Exhibit 2).

3. On March 19, 2001, the MEQB chair accepted the application and notified enXco, Inc. that its application for a site permit for a 79.5-megawatt LWECS and associated facilities was accepted. (Exhibit 3). The MEQB chair, in a memorandum dated March 19, 2001, also appointed John Hynes of the EQB staff as public advisor for the project. (Exhibit 4).

4. On March 28, 2001, enXco's permit application was distributed to MEQB members, the Public Utilities Commission, the Minnesota Historical Society, the office of the Southwest Regional Development Commission, the auditors of Pipestone and Lincoln counties, and township clerks. Each landowner affected by the proposed project also received a copy of the application, the public notice and a copy of the draft site permit. (Exhibit 6). The staff scheduled a public meeting for April 11, 2001, to be held in Lake Wilson, Minnesota.

5. On March 28, 2001, the MEQB staff made available for public review and comment a draft site permit and distributed the draft site permit to MEQB members, Murray and Pipestone County commissioners, township representatives, the landowners affected and other interested persons on the EQB's wind power distribution list. (Exhibits 5 & 6).

6. On March 28, 2001, the MEQB staff also sent a memorandum to MEQB members and technical representatives with copies of the notice of application acceptance and public information meeting. (Exhibit 10).

7. The MEQB published notice of the site permit application, EQB public information meeting and opportunity to comment on the draft site permit in the following newspapers: *Pipestone Star* in Pipestone County on March 29, 2001 and the *Wheel-Herald* in Murray County on April 2, 2001. (Exhibits 8 & 9). The published notice provided: a) location and date of the public information meeting; b) description of the proposed project; c) deadline for public comments on the

draft site permit (May 4, 2001): d) description of the MEQB site permit review process; and e) identification of the public advisor. The published notice meets the requirements of the Interim Site Permit Procedures for Large Wind Energy Conversion Systems adopted by the MEQB in December 1995 at parts IV.A. and V.C.

8. On April 2, 2001, the MEQB published in the *EQB Monitor* notice of an April 11, 2001, public information meeting in Lake Wilson, Minnesota and the availability of the draft site permit, Volume 25, No. 7, April 2, 2001. (Exhibit 7). The published notice contained all of the information required by the Interim Site Permit Procedures at part V.B. MEQB staff also mailed a copy of this notice to all persons on the MEQB's wind power distribution list as required by the interim procedures at part V.C. (Exhibit 6). Notice also appeared on the MEQB web site.

9. The MEQB held a public information meeting on April 11, 2001, in Lake Wilson, Minnesota, to receive comments on the site permit application and draft site permit. Approximately 85 to 90 people attended the meeting. Representatives from enXco, Inc., were also present. enXco responded to questions about the project. Questions were asked about access roads, payment schedules, project timing, easement agreements and conditions, location of distribution and feeder lines, how to get more turbines, project decommissioning, and the need to place safety shields on guy wires. No significant issues or concerns were raised about the proposed project or conditions in the draft site permit at the public meeting.

10. enXco contacted EQB staff on April 9, 2001, regarding the proposed amendment of its original application to add eight turbines to the original proposal for 53 turbines, for a total of 61 turbines. enXco is proposing to located those turbines in sections 19 and 20 in Cameron Township (See Attachment I, area D). An alternate location was also proposed that included all of Sections 16 and 21 and the south half of Section 15 in Chanarambie Township (See Attachment 1, area C). This was confirmed in a letter to the EQB chair, dated April 23, 2001 from Terracon, a consultant for enXco, Inc. (Exhibit 11). This change was discussed at the April 11, 2001, public information meeting in Lake Wilson. Notice of this site permit application amendment was also published in the *Wheel-Herald*, on Monday, April 16, 2001 and the *Pipestone Star* on April 12, 2001. (Exhibit 12). Terracon, in a letter to the EQB chair on April 27, 2001, identified the presence or absence of features that may be important in the EQB's evaluation and decision on the site permit application. (Exhibit13).

The Permittee

11. enXco has formed a general purpose limited liability company called Chanarambie Power Partners, LLC, which will own and operate the Chanarambie Wind Power Plant. Chanarambie Power Partners will negotiate a power purchase agreement with Xcel Energy, Inc. to supply electricity generated by the project. enXco is the General Manager of Chanarambie Power Partners and is acting on

behalf of the LLC during this permit proceeding. enXco currently owns 100% of the membership interest of CPP.

12. Xcel Energy, Inc. (formerly Northern States Power Company) selected Chanarambie Power Partners, LLC to be a supplier of wind energy pursuant to a competitive solicitation. The Minnesota Public Utilities Commission must approve the implementation of the Project.

13. Cinergy Global Power, Inc., a wholly owned subsidiary of Cinergy Corp, has indicated a desire to purchase a 100% membership interest in CPP, concurrent with the signing of a power purchase agreement with Xcel Energy, Inc. enXco would continue to be the Engineering/Procurement/Construct contract manager and the O&M provider supplying the services to CCP during the life of the contract.

Project Description

14. The proposed 79.5-megawatt Chanarambie Power Project will consist of up to 61 Enron Wind 1.5-megawatt wind turbine generators (nameplate capacity 91.5 MW) mounted on freestanding tubular towers. Originally, the project was to consist of 53 turbines (nameplate capacity 79.5 MW), but CPP amended its application to include up to eight additional turbines. The purpose of adding eight additional turbines is to generate more electricity to optimize use of the interconnection at the substation and to provide a higher capacity factor at low wind energy conditions.

15. The height of each tower is 213 feet (65-meters) and hub height is 235 feet (71.6-meters). Each turbine blade is 116 feet (35.25-meters) long. The rotor diameter is approximately 232 feet (70.5-meters) across. The rotor swept area is approximately 42,000 square feet (3,904-square meters) or approximately one acre. The overall height of the tower, nacelle and blade will be approximately 328 feet (100 meters). The project will also include an underground-automated supervisory control and data acquisition system (SCADA) for communication purposes. Up to four permanent meteorological towers will be used as part of the communication system. Other components of the project include a concrete and steel foundations for each tower, pad-mounted step-up transformers, all weather class 5 roads of gravel or similar material, and underground electric energy collection system.

16. The Enron Wind 1.5 MW wind turbine is a three blade, upwind, active yaw, and active aerodynamic control regulated wind turbine with power/torque control capabilities. The rotor utilizes blade pitch regulation and variable speed operation to achieve optimum power output at all wind speeds. The variable speed operation minimizes power and torque spike delivered from the rotor to the drive train resulting in improved long-term reliability. Each turbine is equipped with a wind direction sensor. The wind direction sensor communicates with the

computer system, which evaluates the measured wind parameters, and with a specified time interval activates the yaw drives to align the nacelle to the wind direction.

17. Each turbine is interconnected through an underground electrical collection system at 34.5 kV. The collection system makes up the backbone of the electrical collection/distribution system. The 34.5 kV feeder lines from the project collection system feed to the independent breaker positions at the substation. The substation steps up the voltage from the collection system of 34.5 kV to the transmission system level of 115 kV. The applicant is proposing to place the 34.5 kV feeder lines underground where possible. All of the proposed feeder lines would connect to the Chanarambie Substation.

18. The blades are made of fiberglass with a smooth layer of gel coat that provides ultraviolet protection. The blades will be white in color. The blades will be equipped with lightning protection. The entire turbine is also grounded and shielded to protect against lightning.

19. Each tower will be secured by a concrete foundation that will vary in size depending on the soil conditions. A control panel that houses communication and electronic circuitry is placed in each tower. In addition, a step-up, pad-mounted transformer is necessary for each turbine to collect the power from the turbine and transfer it to a 34.5 kV collection system via underground cables.

20. All turbines and a meteorological tower system will be interconnected with fiber optic communication cable that will be installed underground together with the 34.5 kV cable. The communication cables will run back to a central host computer which will be located either at the substation or the operations and maintenance facility where a supervisory control and data acquisition system will be located. Signals from the current and potential transformers at each of the delivery points will also be fed to the central SCADA host computer. The SCADA system will be able to give status indications of the individual wind turbines and the substation and allow for remote control of the wind turbines locally or from a remote computer in California. MEQB and Commerce staff will have access to the SCADA system for monitoring purposes only. This computerized supervisory control and data acquisition network will provide detailed operating and performance information for each wind turbine. enXco, Inc., will maintain a computer program and database for tracking each wind turbine's maintenance history.

21. Housed inside the fiberglass nacelle that sits on the top of the tower is the generator, brake system, yaw drive system and other miscellaneous components.

Wind Resource Considerations

22. The Chanarambie Wind Power Project will be located along Buffalo Ridge in Murray County. Buffalo Ridge rises about 200 feet above the surrounding terrain with a general orientation northwest to southeast. Winds perpendicular to the ridge are topographically accelerated as they flow over the ridge. Land use in the Buffalo Ridge area is agricultural with intensive farming and grazing activities and, as a result, there are fewer trees or structures in the proposed project site to inhibit the wind as it passes over the ridge. The wind resource in the Buffalo Ridge area is well documented by the Minnesota Department of Commerce.

23. For this project the wind turbines will be sited in clusters or strings along hilltops and ridgelines within the site boundaries. The wind turbines are sited so as to have good exposure to winds from all directions with emphasis on exposure to the prevailing southerly wind direction. The turbine spacing, according to Chanarambie Power Partner's application, maximizes use of the available wind and minimizes wake and array losses within the topographical context of the site. The turbine strings are typically oriented west-northwest to east-southeast, which is roughly perpendicular to the prevailing southerly winds. Turbine placement has been designed to provide 4 to 5 rotor diameter spacing in the east-west direction and 7 to 8 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing is widest in the north-south direction. Greater or lesser spacing between the turbine strings was used in areas where the terrain dictated the spacing. Individual, isolated turbine sites are avoided to minimize interconnect and access costs. Sufficient spacing between the turbines is utilized to minimize wake losses when the winds are blowing parallel to the turbine rows.

24. The gross annual energy output per turbine is estimated to be 6,400-megawatt hours (MWh). Assuming an efficiency of 85.39 percent the net annual energy output per turbine is expected to be 5,465 MWh. If 61 turbines are used, the project will produce approximately 333,365 MWh per year. The base energy calculation presented assumes a normal or average wind year. The maximum variation in energy has been within +/- 13 percent. Based on the data, one would expect the annual variation in energy at the project site to be within 10 percent of the mean during most years.

25. The project site includes approximately 6,000 acres of land in the townships of Cameron and Chanarambie in Murray County. The land is predominately agricultural, with some scattered wooded areas, and wetlands. The proposed wind turbine site layout in the site permit application shows where the proposed facilities, such as towers, roads and the underground electrical lines, will be located. These locations are preliminary and subject to change. It is estimated that the proposed facilities will result in the permanent disturbance of approximately 23 acres of land, primarily for roads and towers. Some additional acreage will be temporarily disturbed during construction of the wind power plant

for contractor staging areas, foundation construction, underground power lines, and tower and turbine assembly. Roads are expected to be about 16 feet wide.

Land Rights and Easement Agreements

26. In order to build a wind plant, a developer needs to secure site leases and easement option agreements to ensure access to the site for construction and operation of a proposed project. These lease or easement agreements also prohibit landowners from any activities that might interfere with the execution of the proposed project.

27. enXco holds some fully executed lease and easement options within the boundary of the proposed project that have been recorded with the county recorder as indicated in the site permit application. These rights and easements will be available to Chanarambie Power Partners for this project.

28. Some of the land that enXco is proposing to use is under an easement option held by Enron Wind Company, specifically land in portions of Section 19 and 20 in Cameron Township. Navitas Energy, LLC. is also proposing to construct a large wind energy conversion system in these same two sections. Enron has had discussions with both enXco and Navitas Energy on a non-exclusive basis for the use of this land. At this time it is not known whether enXco or Navitas will be able to use these parcels. It will depend on who can execute a turbine purchase agreement with Enron and be assigned those wind rights by Enron. The permit recognizes that the developer who obtains the wind rights from Enron in these sections will be allowed to construct turbines in those sections, and the other developer will not.

29. Another area within the proposed boundary of the site - Sections 16 and 21 and the south half of section 15 in Chanarambie Township - is controlled by Project Resources Corporation, another wind developer. Those rights may be assigned to enXco if necessary. (Exhibit 14) Navitas Energy, LLC, in a letter dated May 3, 2001, and at the public information meeting on the Navitas project in Lake Wilson on April 10, 2001, stated that it would relocate its proposed turbines in these Sections out of respect for preexisting easements. Murray County has already issued six conditional use permits to six limited liability corporations to construct wind turbines on parcels in sections 16 and 21. (Exhibit 16). Each of these projects would be less than 2 megawatts in size, to take advantage of incentives provided under Minnesota law.

Written Comments and Letters Received by May 4, 2001

30. By the close of business on May 4, 2001, the MEQB had received seven comment letters and one comment by fax on the proposed project.

31. The first letter was from Dennis Gimmestad of the Minnesota Historical Society, dated April 27, 2001. (Exhibit 17). The Historical Society emphasized the need to do a cultural resource survey of the project area. The EQB has required all LWECS permit holders to conduct an archaeological reconnaissance survey within the area that will be impacted by the project and to provide the results to the Historical Society to determine whether any cultural resources are present. CCP will be required to perform the same tasks under Permit Condition III.D.2.

32. The second letter (undated) was received on May 3, 2001, from Rich and Nancy Vander Ziel, 426 66th Street, Chandler, MN 56122. The Vander Zeal's property is located in the NW quarter of Section 35 in Chanarambie Township. (Exhibit 18). No turbines have been proposed for the Vander Ziels' property. The Vander Ziels raised several concerns about turbines intended to be placed on their immediate neighbors' property. enXco representatives have met with the Vander Ziels and have reached an accommodation addressing their concerns. The Vander Ziels have no objection to the issuance of the permit. (Exhibit 21).

33. The third letter was from the Minnesota Department of Natural Resources, dated May 4, 2001. The DNR raised several issues in their letter.

    a) The DNR letter pointed out that the site permit application did not include the bat species documented in mortality searches at Buffalo Ridge. The DNR letter also noted a two-year study of turbine related bat mortality that will begin this year and stated: "should the study identify significant impacts to bat populations, it may be necessary to consider mitigative amendments to this permit, as well as to previously-issued permits".

    b) The DNR further noted that the site permit requires a preconstruction inventory of biologically sensitive resources and prairie protection and mitigation plan. The DNR letter also called attention to studies that: "found reduced use by some grassland species in close proximity (less than) 100 meters) to turbines, but concluded population-level effects were unlikely". DNR noted that if the inventory identified state-listed bird species nesting in the project vicinity, the DNR would request setbacks from the nesting sites. The DNR letter also encouraged the avoidance of native prairie whenever possible but stated they would work with the permittee to develop mitigation plans where impacts are unavoidable.

    c) The DNR letter pointed out that the application at Section F. 13 did not include surface waters listed in DNR's Protected Waters Inventory. The North Branch of Chanarambie Creek, which begins in Section 6 (Chanarambie Township) and crosses sections 7 and 8, is DNR protected water. Any work required below the ordinary high water line, such as road crossings or culvert installation, will require a permit from the Department.

d) The last point in the DNR letter pointed out that the federally-endangered, and state special concern Topeka shiner (*Notropis topeka*) is known to occur in Chanarambie Creek approximately three miles from the project site, in the Salt and Pepper WMA. Because of the species' preference for slow-moving water and off-channel habitats, the DNR recommends that the creek should be treated as though the shiner is resident at the project site, and construction best management practices should be strictly followed. The letter recommended several best management practices that should be followed.

e) The DNR letter, dated May 4, 2001, for the Navitas Project noted the presence of native prairie in pastures located sections 16 and 21 of Chanarambie Township, that when not grazed qualified for native prairie tax exemption. These parcels are included in the amended enXco application and are no longer available to Navitas Energy.

f) DNR staff recommends permit approval with the conditions noted above.

34. Site permit conditions III.C.4, C.5., and C.6. and III.D 1 address most of the DNR concerns. A special condition addressing the concern over impacts on Chanarambie Creek and the Topeka shiner will be included to require best management practices if turbines are installed near the Creek.

35. The fourth letter was from enXco, Inc., dated May 1, 2001. (Exhibit 14, 2001).

This letter points out that land controlled by Project Resources Corporation in Sections 16, 21 and the south one-half of section 15 is not available to Navitas Energy for their use as part of their 130-megawatt site permit application for an LWECS. It also points out that Enron Wind, in an April 30, 2001 letter that is attached to the enXco letter, offers those parcels to enXco on a non-exclusive basis.

36. This issue over wind rights in Sections 16 and 21 and the south one-half of Section 15 in Chanarambie Township has been resolved by Navitas Energy withdrawing its request for approval to build in those areas.

37. The comment by fax was from the Murray County Environmental Services Office to Larry Hartman, dated April 23, 2001. The fax included copies of six conditional use permits granted for wind power development in sections 16 and 21 of Chanarambie Township. The permits were issued to: Buffalo Ridge Wind Farms LLC, North Ridge Wind Farms LLC, Moulton Heights Wind Farm LLC, Wilson-West Wind Farm LLC, Viking Wind Farm LLC and Vandy South Project LLC. The conditional use permits are dated March 13, 2001.

38. The fifth comment letter from was from Navitas Energy, dated May 1, 2001, raising the issue of land rights in Sections 19 and 20 in Cameron Township. This

issue has been discussed in other findings and by a condition in the permits for both projects recognizing that only one of the developers can obtain the rights in these Sections. The EQB finds that language in the site permit addresses this issue.

39. The sixth letter was from enXco to EQB, regarding the Site Permit Application of Navitas Energy, dated May 3, 2001. This letter acknowledges a meeting between EQB staff and representatives of enXco, on May 3, 2001. Representatives of Enron Wind and Navitas Energy also participated in portions of the meeting by telephone. The purpose of this meeting was to resolve overlapping land issues.

40. Navitas Energy also submitted a letter to EQB staff, dated May 1, 2001, commenting on the need to reflect the allocation of costs among the existing wind projects and the proposed Navitas Energy and Chanarambie Power Partners projects for an avian study performed by Northern States Power Company between 1995 and 2000 along Buffalo Ridge. The avian study was completed in 2000. The EQB approved a cost allocation mechanism in March 1996 that required all LWECS developers through the end of 2002 to pay a proportionate share of these costs. The permits for both projects require the permittees to pay an allocated share of the costs of the avian study. The permittees were aware of this requirement when they proposed their projects and do not object to paying their proportionate shares. It is reasonable to defer the calculation of the proportionate share to Xcel Energy and their escrow agent and to allow the permittees to pay their shares upon receipt of project financing.

40A. Presently, Northern States Power Company, under an agreement with the Department of Natural Resources, is conducting a bat mortality study along Buffalo Ridge. A cost allocation mechanism for the bat study, similar to the one for the avian study, was approved by the Board in May 2001. The permittees were aware of the requirement to contribute to the cost of the bat study when they proposed their projects, and they do not object to paying their proportionate shares. An escrow agent has been appointed by the wind developers to administer the fund for the bat study. It is reasonable to allow the escrow agent to determine the amount each permittee owes and to assure payment of the proportionate shares.

Power Purchase Agreement

41. The other major point raised by Navitas Energy in its May 1, 2001 letter is the requirement in the Board's Interim Site Procedures for LWECS that an applicant for a site permit have a power purchase agreement before a site permit is granted. Navitas in its letter stated: "Until a PPA is actually in place, there is no assurance that the proposed project will be built as bid or proposed in the application."

42. Neither enXco nor Chanarambie Power Partners has a power purchase agreement for the electricity to be generated by this proposed project. The purpose of the requirement for a power purchase agreement was to ensure that a developer did

not tie up a large area of land for wind generation when the project was not likely to go forward in a timely fashion. In this case, CPP has been selected by Xcel Energy to be the supplier of wind energy pursuant to a competitive solicitation. The Minnesota Public Utilities Commission must still approve the implementation of the project. However, enXco does hold land rights and easement agreements within the project boundary and is in negotiations with Xcel for a power purchase agreement. It is reasonable to allow CPP to proceed with its permit application, notwithstanding that it has not finalized a power purchase agreement. It is also reasonable to recognize that unless CPP can obtain a power purchase agreement within a reasonable time, this permit should be null and void. Given the fact that CPP plans to complete construction of this project yet this year, a period of approximately one year (May 2, 2002), is a reasonable time to finalize a power purchase agreement.

Site Criteria

43. Minnesota Statute s 116C.57, subd. 4 (2000) is one of the provisions of the Power Plant Siting Act that is applicable to LWECS. See Minnesota Statutes 116C.692(a). Section 116C.57, subdivision 4, sets forth a number of criteria that should be used to guide the MEQB in certifying sites for large electric power generating plants. These criteria are applied to the siting of a LWECS.

Minnesota Rules part 4400.3310, subp. 1 (1999) sets forth considerations the MEQB must use in the evaluation and designation of sites for LEPGPs. These criteria also apply to the approval of an LWECS site.

The application for the LWECS analyzed the factors set forth in Minn. Rules part 4400.3310, subp. 1 and as required by part X.F. of the interim site procedures.

The following analysis addresses those criteria of Minnesota Statutes 116C.57, subd. 4 and Minnesota Rules part 4400.3310, subp.1, that can be applied to site evaluation of the Chanarambie Power Partners 79.5-megawatt LWECS.

Human Settlement, Public Health and Safety

44. The site is in an area of low population density, with little residential, commercial or industrial development on or near the site. As a result, the impact of the proposed LWECS on human settlement, public health and safety will be minimal. The site permit, at part III. C., has conditions for setbacks from residences and roads. The proposed wind turbine layout meets or exceeds those requirements. The proposed project is not expected to affect any water wells (used, unused or unsealed) or any rural water system that services the area.

45. There will be no displacement of existing residences or structures in siting the wind turbines and related facilities.

46. The project will comply with the Federal Aviation Administration requirements with respect to lighting. See site permit condition III.E.5.

47. Chanarambie Power Partners and enXco, Inc., will provide security during construction and operation of the project, including fencing, warning signs, and locks on equipment and facilities. Chanarambie Power Partners and enXco will also provide landowners and interested persons with safety information about the project and its facilities. See site permit condition III.B.15.

48. In winter months ice may accumulated on the wind turbine blades when the turbines are stopped or operating very slowly. Furthermore, the anemometer may ice up at the same time, causing the turbine to shut down during any icing event. As weather conditions change, any ice will normally drop off the blades in relatively small pieces before the turbines resume operation. This is due to flexing of the blades and blades smooth surface. Although turbine icing is an infrequent event, it remains important that the turbines are not sited in areas where regular human activity is expected below the turbines or in the immediate proximity during the winter months.

49. Each turbine door will be clearly labeled to identify each unit and a map of the site with the labeling system will be provided to local authorities as part of the fire protection plan.

Noise

50. Wind turbines do generate noise. Enron Wind and associated noise consultants recommend a maximum noise threshold of 45 dBA at occupied homes. According to sound pressure level tests and estimations provided by Chanarambie Power Partners in their application for a site permit, the sound pressure level is expected to be lower than the PCA noise standard of 50 dBA measured at the closest residence. For this project, the site permit application indicates that at a distance of 1,000 feet from turbines, the noise measured at a home will be less that 45 dBA. According to Figure 19 of the application, at a distance of approximately 500 feet, the noise level will be 45 dBA.

Visual Values

51. The placement of up to 61 turbines will affect the appearance of the area. The EW 1.5 MW wind turbines will be mounted on tubular towers that are 213 feet tall. The rotor blades will have a diameter of 232 feet. The turbine towers and rotor blades will be prominent features on the landscape. There will be intermittent, expansive views of the turbines to passing motorists on state highways 30 and 91. Local township and county roads will bring motorists closer to the turbines.

52. The visual impact of the wind turbines will be reduced by the use of a neutral paint color. The only lights will be those required by the Federal Aviation

Administration. All site permits issued by the MEQB require the use of tubular towers; therefore, the turbine towers will be uniform in appearance. These wind turbines will be the dominant visual features on the ridge. The turbine towers will be similar to those used on the NSP Phase III/Enron Wind II project in Pipestone county and the Woodstock Wind Farm project. Blades used in the proposed project will be white, rather than black. The wind turbines in this project, while prominent on the landscape, also blend in with the surrounding area. The project site will retain its rural character. The turbines and associated facilities necessary to harvest the wind for energy are consistent with existing land use and agricultural practices.

53. From one perspective, the proposed project might be perceived as a visual intrusion on the natural aesthetic value on the landscape, characterized by up to 61 tubular steel structures approximately 213 feet high, standing on formerly undisturbed ridgelines, with 115-foot blades, for an overall height of 328 feet when one blade is in the vertical position. On the other hand, wind plants have their own aesthetic quality, distinguishing them from other non-agricultural land uses.

On the other hand, wind plants have their own aesthetic quality, distinguishing them from other non-agricultural uses. In the last several years all of the overhead electric distribution lines and telephone lines in northwestern Murray County have been placed underground, which does open up the viewshed for people traveling through the area. The existing wind plants have altered the landscape in the area from agricultural to wind plant/agricultural. This project will add to visual impact of the area. The cumulative effect of the proposed project will increase both the industrial appearances of the wind plants on Buffalo Ridge and the areas from which they will be seen. Because wind generation development is likely to continue on the ridge, this visual impact will continue to increase the size of the wind plant/farm footprint as the turbines harvest the wind resources of Buffalo Ridge for energy. To date the presence of the wind turbines on the Buffalo Ridge has been well accepted by the people who live and work in the area.

54. Several other measures will also be taken to minimize visual intrusion such as: low profile access roads, project access roads will avoid cuts and fill, the areas affected by construction will be restored after construction is completed, turbines will not be illuminated unless required by FAA regulations, the turbine rotor size will require increased turbine spacing to minimize wake loss, therefore the turbines will be spaced further from one another than in other projects on Buffalo Ridge. The visual scale will be similar.

Recreational Resources

55. Recreational opportunities in Murray County include hunting, fishing, snowmobiling, campgrounds, and trails. Hunting is permitted in designated state

Minnesota Department of Natural Resources wildlife management areas (WMA's), unless otherwise posted.

56. There are two WMA's located within a 3-mile radius of the project site and one State Trail. WMA's are managed to provide wildlife habitat, improve wildlife production and provide public hunting and trapping opportunities. These MDNR lands were acquired and developed primarily with hunting license fees. WMA's are closed to all-terrain vehicles and horses because of detrimental effects on wildlife habitat.

57. The turbines will be noticeable to recreationalists using the WMA's and State Trail, within the 3-mile radius of the project site. Turbines will not be located in WMA's, or any local parks. Turbine operations are not expected to affect the natural areas in any material way and no adverse impact on wildlife management areas or practices is expected.

Infrastructure

58. The proposed wind farm is expected to have a minimal effect on the existing infrastructure. The proposed project will use underground cables for the collector lines on private property within the wind farm. The feeder lines that are typically overhead lines and located in public road rights-of-way will also be underground, unless it is not feasible to do so. The feeder lines will deliver the energy from the wind farm to the Chanarambie Substation. Placement of collector and feeder lines is addressed in the site permit at III.E. 8. and 9.

59. The project will require the use of public roads to deliver construction supplies and materials to the work site. Site permit condition III.B.8. addresses this topic. Construction of the project requires the addition of approximately 18 miles of access roads that will be located on private property. The access roads will be routed along the wind turbine strings, fence lines, and field edges to minimize disturbance to agricultural activities. The typical access road will be 15 to 20 feet in width and covered in Class 5 gravel (or similar material). The access roads will be low profile roads to allow for the movement of agricultural equipment. The site permit at III.B. 8 (b) addresses this topic. During operation and maintenance of the wind plant, operation and maintenance crews, while inspecting and servicing the wind turbines will use access roads. The roads will be maintained by periodic grading or other methods necessary to maintain road integrity. The permittee may do this work or contract it out.

60. If access roads must be installed across streams or drainage ways, the permittee in consultation with the Minnesota Department of Natural Resources will design, shape and locate the road so as not to alter the original water flow or drainage patterns. Any work required below the ordinary high water line, such as road crossings or culvert installation, will require a permit from the Minnesota Department of Natural Resources. Representatives of Chanarambie Power

Partners have indicated that they will work with the Minnesota Department of Natural Resources to address the concerns raised by the DNR in a letter to the MEQB, dated May 4, 2001. (Exhibit19). These items will also be addressed in a preconstruction meeting with the permittee. The Department of Natural Resources will also be invited to participate in this meeting.

61. The proposed wind farm will not affect water supplies, railroads, telephone, and radio reception. The presence or operation of the wind plant may or may not impact the quality of television reception in the area. Previous work on this subject indicates than in some cases new antenna or tuning of antennas has solved the problem. Chanarambie Power Partners will address the concerns of residents in the area of the project site before and after the project construction to document and mitigate any impacts that might occur. This is addressed in the site permit at III. F. 3.

62. Construction, operation, and maintenance of the proposed wind plant will comply with all of the required federal and state permit requirements.

Community Benefits

63. The project will provide local tax revenues. No significant adverse impact on public services is expected. Wear and tear on roads will occur as a result of the transport of heavy equipment and other materials. The site permit at III. B. 8. Addresses road damages. Landowners with turbine(s) on their property will also receive payments from the permittee for energy generated by the turbine(s).

64. To the extent that local workers and local contractors are capable, qualified, and available, Chanarambie Power Partners will seek to hire them to construct the proposed project. The hiring of local people will expand employment opportunities in this area of the state and keep money in the local economy. Once constructed, the project will require operations and maintenance workers.

Effects on Land-Based Economies

65. The wind turbines and access roads will be located so that the most productive farmland will be left as intact as possible. However, the project will displace approximately 23 acres of agricultural land. The site permit at III.B. 2., 3., 4., 5., 6., 7., 8(c)., 9., and 10. addresses mitigation measures for agricultural lands. The proposed project does not affect any sand or gravel operations.

Archaeological and Historical Resources

66. All known archaeological and historical sites will be avoided in designing and constructing the project. The project area is located in rough proximity to petroform effigies, earthworks, lithic and artifact scatters, village sites, and a ghost town. The geographical prominence of Buffalo Ridge made it a significant

location for Native Americans, especially the Dakota Indians. A review of the Minnesota State Historic Preservation Office (SHPO) computer data base indicates that there are no buildings or structures within one mile of the project site that are listed on the State List or the National Register of Historic Places

67. enXco's application at page 47 states: "The archaeology field assessment and background research indicates that the project site has a high potential to contain previously undocumented archaeological resources." The application further states: "Based on the results of this assessment survey, a Phase I archaeology survey is recommended for all the proposed strings, wind turbine locations, access roads, junction boxes, the O&M building, and areas of construction impact for the proposed feeder lines to document any previously unrecorded archaeological sites within the project site. The site permit at III. D.2. requires an archaeological reconnaissance survey. A Phase I archaeology survey consists of the following tasks: consultation, documentation, and identification."

68. If any archaeological sites are found during the Phase I survey, their integrity and significance should be addressed in terms of the site's potential eligibility to the NRHP. If such sites are found to be eligible for the NRHP, appropriate mitigative measures will need to be developed in consultation with the Minnesota SHPO, the State Archaeologist, and consulting American Indian communities The site permit also requires the permittee to stop work and notify the Minnesota Historical Society and MEQB if any unrecorded cultural resources are found during construction.

Air and Water Emissions

69. No harmful air or water emissions are expected from the construction and operation of the LWECS.

Animals and Wildlife

70. Development of the wind farm, including the construction and operation of the project, is expected to produce a minimal impact on wildlife. Based on studies of existing wind power projects in the United States and Europe, the impact to wildlife would primarily be avian and bat populations. The final report on avian monitoring studies at Buffalo Ridge, Minnesota identified the following impacts:

    a) Following construction of the wind turbines, there is a reduction in the use of the area within 100 meters of the turbines by seven of 22 species of grassland breeding birds. It was hypothesized that lower avian use may be associated with avoidance of turbine noise, maintenance activities, and less available habitat. The researchers stated that "on a large scale basis, reduced use by birds associated with wind power development appears to be relatively minor and would not likely have any population consequences on a regional level."

b) Avian mortality appears to be low on Buffalo Ridge, compared to other wind facilities in the United States, and is primarily related to nocturnal migrants. Resident bird mortality is very low and involves common species. The researchers stated that "based on the estimated number of birds that migrate through Buffalo Ridge each year, the number of wind plant related avian fatalities at Buffalo Ridge is likely inconsequential from a population standpoint".

c) Bat mortality was also initially studied during the avian monitoring studies. Bat mortality appears to be turbine-related. The MN-DNR has requested additional studies be performed to quantify the impacts to bat populations. Those studies are scheduled to be performed in 2001and 2002, and Chanarambie Power partners will contribute to study costs.

71. The impact of wind power development on resident wildlife is expected to be minimal. The only measurable impacts may be a small reduction in the available habitat that some of the resident wildlife use for forage or cover. Operation of the wind farm will not change the existing land use.

72. Mitigation measures are also prescribed in the site permit and include but are not limited to: a) a pre-construction inventory of existing biological resources, native prairie, and wetlands in the project area; b) turbines and associated facilities will not be constructed in wildlife management areas, recreation and state and scientific natural areas; c) trees and shrubs that are important to the wildlife present in the area will not be disturbed; d) sound water and soil conservation practices during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion will be taken. This also applies to any work in proximity to watercourses.

73. The DNR in its comment letter dated May 4, 2001 commented that the federally-endangered, and state special concern Topeka shiner (*Notropis topeka*) is known to occur in Chanarambie Creek approximately three miles from the project site, in the Salt and Pepper WMA in Section 29 of Chanarambie Township. Due to the species' preference for slow-moving water and off-cannel habitats, it is likely that the shiner moves throughout the upper reaches of Chanarambie Creek while there is sufficient water. The creek should be treated as though the shiner is resident at the project site, and construction best management practices should be strictly followed. This is addressed in the site permit at III. M.5.

Vegetation

74. No public waters, wetlands or forested land are expected to be affected by the LWECS. No groves of trees or shelterbelts will need to be removed to construct and operate the system. Native prairie will also be avoided. If native prairie

cannot be avoided, the site permit, at III. C.6. provides for preparation of a prairie protection and management plan.

Soils

75. Construction of the wind turbines and access roads increases the potential for erosion during construction and converts prime farmland to industrial use. The site permit at III. B. 9. requires a soil erosion and sediment control plan. The project will also require a storm water run-off permit from the Minnesota Pollution Control Agency.

Surface Water and Wetlands

76. No towers, access roads or utility lines will be located in surface water or wetlands. See site permit at III.C.5.

Future Development and Expansion

77. Other wind projects may be installed throughout Buffalo Ridge, north and south of the Lake Wilson, Woodstock and Chandler areas. The wind resources in the area have not been fully measured. Current information suggests the Ridge's windy areas are large enough to accommodate more wind facilities. In the future, turbines used at the Ridge likely will consist of several types and sizes supplied by different vendors and installed at different times.

The cumulative impact of this development cannot be determined at this time. While large-scale developments have occurred elsewhere, little systematic study of the cumulative impact has occurred. Little research on the total impact of many different projects in one area has not occurred, in part because complete data has not been collected. EQB staff will continue to monitor for impacts related to wind energy development.

78. The MEQB anticipates more site permit applications under Minnesota Statutes section 116C.694(a) until all the developable wind areas at Buffalo Ridge are utilized.

The MEQB is responsible for siting of LWECS "in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources." Minnesota Statutes section 116C.693.

Minnesota Statutes section 116C.57, subd. 4 (3) and (4) requires consideration of design options that might minimize adverse environmental impacts. By using larger turbines, fewer turbines are required, reducing siting needs for turbines and related facilities. Turbines must also be designed to minimize noise and aesthetic impacts. Buffers between strings of turbines are designed to protect the turbines' production potential. The site permit also provides for buffers between adjacent

wind generation projects to protect production potential. See site permit at III.C.1. Xcel's competitive bidding process has also created substantial incentives for design efficiencies and reduced environmental impact.

79. The location and spacing of the turbines are critical to the issues of orderly development and the efficient use of wind resources. Turbines are likely to be located in the best winds, and the spacing dictates, among other factors, how much land area the project occupies. There is strong public support for orderly development.

80. One efficiency issue is the loss of wind in the wake of turbines. When wind is converted to rotational energy by the blades of a wind turbine, energy is extracted from the wind. Consequently, the wind flow behind the turbine is not as fast and is more turbulent than the free-flowing wind. This condition persists for some distance behind the turbine as normal wind flow is gradually restored. If a turbine is spaced too close downwind of another, it produces less energy and is less cost-effective. This is the wake loss effect. If the spacing is too far, wind resources are wasted and the projects' footprint on the land is unnecessarily large.

For this project, turbine spacing maximizes use of the available wind resources and minimizes wake and array losses within the topographical context of the site. Site topography and wind resources did not lead to a layout involving long strips of turbines running parallel to each other and perpendicular to the prevailing wind. Instead, the site uses shorter strings. The objective was to capture the most net energy possible from the best available wind resource. Allowing for setback from roads and residences and avoiding native prairie and other sensitive areas, Chanarambie Power Partners arrived at an average turbine spacing of about 4 to 5 rotor diameter spacing in the east-west direction and 7 to 8 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing between turbines is greatest in the north-south direction. A wake investigation shows that the estimated array losses will be 4 percent.

Other factors that lead to discounts were assumed to be identical for all arrays and include turbine availability (2 %); transformer and/ line loss (1%); control algorithm, yaw error and, turbulence (1.5%); icing (2%).

Maintenance

81. Maintenance of the turbines will be on a scheduled, rotating basis with one or two units normally off for maintenance each day, if necessary. Maintenance on the interconnection points will be scheduled for low wind periods and coordinated with Xcel. The Chanarambie Wind Power Plant will be staffed with five to six full time site technicians and a wind plant supervisor.

Decommissioning and Restoration

82. The estimated decommissioning cost for the project is one million dollars. Decommissioning activities will include (1) removal of all turbines and towers; (2) removal of all pad mounted transformers; (3) removal of all above-ground distribution facilities; (4) removal of foundations to a depth of four feet below grade; and (5) removal of surface road material and restoration of the roads and turbine sites to previous conditions to the extent feasible. Decommissioning funds will be set aside as specific budget item. A set-aside guarantee will be executed on behalf of the project with an independent administrator for the funds. The independent administrator will report annually to the project on the status of decommissioning funds. The project will report every eight years to the independent administrator with an updated budget for the cost of decommissioning the plant in current-year and decommissioning-year dollars.

Site Permit Conditions

83. Nearly all of the conditions contained in this site permit were established as part of the site permit proceedings of other wind turbine projects permitted by the MEQB. No significant comments were received concerning the requirements in the draft site permit distributed for comment on March 28, 2001. Minor changes that provide for clarifications of the draft site permit conditions have been made. EQB staff has also added language that addresses the Permittee's ability to obtain the wind rights in question for sections 19 and 20 in Cameron township.

84. The site permit contains conditions that apply to site preparation, construction, cleanup, restoration, operation, maintenance, abandonment, decommissioning and all other aspects of the project.

SPECIAL CONDITONS

85. One special condition requires the permittee to report on its efforts to secure financing of the project, and if the permittee is unable to secure financing by May 1, 2002, the permit is null and void. The permittee is planning to construct this project yet in 2001, so it is reasonable to revoke this permit if financing is not obtained within a year of issuance of the permit. The permittee can always apply for another permit at a future time if financing on this project is not obtained.

86. Another special condition requires the permittee to report to the MEQB on developments regarding transmission facilities to transmit wind power off Buffalo Ridge to other areas where the demand is. Although transmission facilities are not the responsibility of the permittee, it is reasonable to require the permittee to report periodically on any developments the permittee is aware of.

87. The permit contains several other special conditions. The reasons for these have been addressed in the findings above.

Based on the foregoing findings, the Minnesota Environmental Quality Board makes the following:

CONCLUSIONS OF LAW

1. Any of the foregoing findings, which more properly should be designated as conclusions, are hereby adopted as such.

2. The Minnesota Environmental Quality Board has jurisdiction under Minnesota Statutes section 116C.694 over the site permit applied for by Chanarambie Power Partners, LLC.

3. The Chanarambie Power Partners, LLC application for a site permit was properly filed and noticed as required by Minnesota. Statutes section 116C.94 and the MEQB's December 21, 1995 Interim Site Permit Procedures for LWECS.

4. The Minnesota Environmental Quality Board has afforded all interested persons an opportunity to participate in the development of the site permit and has complied with all applicable procedural requirements of Minnesota Statutes section 116C.694 and the Interim Site Permit Procedures for LWECS.

5. No objections were filed with the Minnesota Environmental Quality Board by any governmental unit, affected landowner or any other interested person during the 30-day comment period, and no public hearing was requested or is required.

6. The proposed Chanarambie Power Partners, LLC 79.5-megawatt LWECS project will not create significant human or environmental impacts.

7. The conditions contained in the site permit issued to Chanarambie Power Partners, LLC are appropriate and necessary and within the Minnesota Environmental Quality Board’s authority.

8. The Minnesota Environmental Quality Board has the authority under Minnesota Statutes section 116C.694 to establish conditions in site permits relating to site layout and construction and operation and maintenance of an LWECS. The Minnesota Environmental Quality Board is the agency directed to carry out the legislative mandate to site LWECS in an orderly manner compatible with environmental preservation, sustainable development and the efficient use of resources.

Based on the foregoing Findings of Fact and Conclusions of Law, the Minnesota Environmental Quality Board issues the following:

ORDER

The Environmental Quality Board hereby issues a site permit to Chanarambie Power Partners, LLC in the form attached hereto. The site permit authorizes Chanarambie Power Partners, LLC to construct and operate the proposed 79.5-megawatt (nameplate capacity 91.5 MW) large wind energy conversion system in the townships of Cameron and Chanarambie in Murray County, Minnesota in accordance with the conditions contained in the site permit for EQB Docket No. 01-19-LWECS-enXco.

Approved and adopted this 17th day of May 2001

STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD

_____
Gene Hugoson, Chair